

Date: Wednesday, 7/5/2006 2:42:30 PM
 User: Kim Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 350/355 AS X-TUBE FWD
 Job Number : 27826
 Estimate Number : 12485
 P.O. Number : *N/A*
 This Issue : 7/5/2006 S.O. No. : *N/A*
 Prsht Rev. : NC
 First Issue : *N/A* Type : LANDING GEAR
 Previous Run : 27825
 Part Number : D350748101
 Drawing Number : IIN D350-748 P5 PREL *CP 06.07.05*
 Project Number : N/A
 Drawing Revision : PREL
 Material : *N/A*
 Due Date : 7/30/2006 Qty: 1 Um: Each
 Written By : *[Signature]*
 Checked & Approved By : *[Signature]* 06.07.05
 Comment : Est Rev: A New Issue 06-07-05 JLM

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: Photocopy bluefile & type labels per PPPD350-748-101 CHG001 *KJ 06.10.02*

2.0 27826A X-TUBE AS 350/355 HI FWD



Comment: Sub-Component X-TUBE AS 350/355 HI FWD

3.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1
 Pick Packing Kit

4.0 D35001 350 SADDLE



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)
 350 SADDLE
 Batch: *B 28096* *is 2 are not eligible in computer system*

5.0 D35011 BUSHING



Comment: Qty.: 16.0000 Each(s)/Unit Total: 16.0000 Each(s)
 BUSHING
 Batch: *B 128127* ✓

6.0 AN46A Bolt



Comment: Qty.: 16.0000 Each(s)/Unit Total: 16.0000 Each(s)
 Bolt
 Batch: *M101418* ✓

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:31 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 27826

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

7.0

AN441A

bolt



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

bolt

Batch: M101538 ✓

8.0

AN532A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M101648 ✓

9.0

AN960JD416

Washer



Comment: Qty.: 32.0000 Each(s)/Unit Total : 32.0000 Each(s)

Washer

Batch: M19185 ✓

10.0

AN960JD516

Washer



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

Washer

Batch: M101369 ✓

11.0

MS21042L4

Nut



Comment: Qty.: 24.0000 Each(s)/Unit Total : 24.0000 Each(s)

Nut

Batch: M19099 ✓

12.0

MS21042L5

Nut



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Nut

Batch: M101648 ✓

AB06/09/28

13.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

CC6/10/23 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☐ No ☒ DQA: D Date: 06/10/03

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:31 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 27826

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

14.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-101

Location: _____

PPP Rev: _____

DRIFT

10/10/03 (1)

15.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Inspection Level 21

10/10/03 (1)

Job Completion



10/10/03

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

3.10 Apply a continuous bead of Sikaflex-241/-291 or Proseal 890 or MIL-S-8802 Class B2 sealant in the following locations as per Figure 6:

- A) Along saddle/crosstube interface.
- B) Between the saddle flanges.
- C) Along saddle/skidtube interface.

4.0 WEIGHT AND BALANCE

The following weight and balance information is for Dart crosstube installations only. This data should be similar to the existing installation. Differences from the parts removed are the responsibility of the installer.

DART CROSSTUBE	FWD/AFT	WEIGHT	STA	MOMENT
D350-748-101	Fwd	35.2 lb (16.0 kg)	106.3 in (2.70 m)	3742 lb-in (43.2 kg-m)
D350-748-201	Aft	34.7 lb (15.7 kg)	162.4 in (4.12 m)	5635 lb-in (64.7 kg-m)

5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE

WORK ORDER

NO. 27826

Date: Wednesday, 7/5/2006 2:42:45 PM
User: Kim Johnston

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: X-TUBE AS 350/355 HI FWD
Job Number	: 27826A		
Estimate Number	: 12484		
P.O. Number	: <i>N/A</i>	Part Number	: D350748141
This Issue	: 7/5/2006	S.O. No.	: <i>N/A</i>
Prsht Rev.	: NC	Drawing Number	: D350-748-141 PREL
First Issue	: <i>N/A</i>	Project Number	: N/A
Previous Run	: 27825A	Drawing Revision	: PREL
	Type : LANDING GEAR	Material	: <i>N/A</i>
Written By	: <i>[Signature]</i>	Due Date	: 7/30/2006
Checked & Approved By	: <i>[Signature]</i>	Qty:	: 1 Um: Each
Comment	: Est Rev:A New Issue 06-07-05 JLM		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
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Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D350-748-141 CHG001

KS 06 10 02

2.0	D6017115	Crosstube Material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Crosstube Material

D6017-115

2.339" OD X 2.000" ID

Batch: *B27318**YML 06/07/14**[Signature]*

3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
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Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs DT *N/A* on both ends as per Folio FA648

2-Turn first side as per Folio FA648

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D350-748-141.

YML 06/07/14

4.0	QC1	INSPECT ALL DIM TO DIM SHEET
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Comment: INSPECT ALL DIM TO DIM SHEET

YML 06/07/14

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			
06.09.17	3	Taper machined does not match dwg at some locations	CP 06.09.17 per QSI 042	Part is OK PER ATTACHED DS EMAIL	per 06.07.14	06.09.17 per QSI 042	06.09.17 per QSI 042	06.09.17

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: ☒ _____ Date: 06/10/03

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:45 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 27826A

Part Number: D350748141

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA648

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D350-748-141.

ml 06/07/14

6.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

ml 06/07/14

7.0

QC8

SECOND CHECK



Comment: SECOND CHECK

SG 06.07.16

8.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O:

Heat Treat to min 180 KSI As per Dwg D350-748-141

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

u 06.07.18

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformity is attached

RB 06/07/31

10.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

RB 06.09.06



11.0

BENDING

BENDING MACHINE

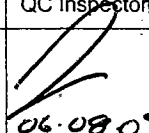
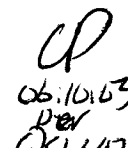
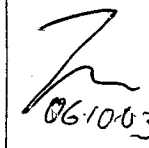


Comment: BENDING MACHINE

Bend tube as per Dwg D350-748-141 using CNC bender program *NA* and Folio FT *NA*

u.1 QC 6 dim-check

06-09-07
P10

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector	
060809	11.1	QC 6 dim check before drilling Perm. change					 06-08-09	
061003	14	CAD Plate and Magnetic Particle Inspect per DS D36-74841 Rev.C. Acceptable to CAD plate to spec AMS-QQ-P-416B See attached DS email				 06-10-03 per DS 642	 06-10-03	

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:46 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 27826A

Part Number: D350748141

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Remove all marks from tube within limits of D350-748-141

DP 6-8-21

2-Drill Tube as per Dwg D350-748-141

DP 6-8-28

3-Deburr

DP 6-8-28

4-Engrave Part # and Batch # as per Dwg D350-748-141

Direct Seq. #5

13.0

QC6

DIMENSIONAL CHECK

QL5



7-6-9-07 (1)



Comment: DIMENSIONAL CHECK

14.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038

Issue P/O: 2000

LPI as per ASTM 1417 Level 2

Attach copy of NDT results to work order

C Loc 109111 (1)

PTO →

15.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage Ensure copy of NDT results attached to work order.

U 06-09-28

16.0

QC6

DIMENSIONAL CHECK



U 06-09-28 (1)



Comment: Inspect for damage & ensure results are as per Dwg D350-748-241

17.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside crosstube as per QSI 005 4.2

PRIME OUTSIDE OF CROSS TUBE PER QSI 005 4.2

MM 06 09 28 (1)

U 06.09.25

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector	
06.09.25	17 19	PRIME INSIDE & OUTSIDE OF CROSSTUBE THEN PAINT OUTSIDE PER QSI 65 4.2 PER DSSO-748-141 Rev.C	MM	06 09 28	①	UP 06.09.25 Per QSI 642	J 06-10-03	
06.10.03	27	Grinding wire hole 0.090" too far inboard. This is acceptable for this crosstube				UP 06.10.03 Per QSI 042	J 06-10-03	

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:46 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 27826A

Part Number: D350748141

Job Number:



Seq. #:

Machine Or Operation:

Description :

18.0

QC14

Inspect Spray Paint



Comment: Inspect Spray Paint

Then, Wrap in plastic bag to protect from scratches

N/A 2

19.0

POWDER COATING

PAINT

POWDER COATING



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QST 005-4.3

PAINT OUTSIDE OF CRUSSTUBE PER QST 005 4.2

UP 06.09.25

MT 06-09-28

(1)

20.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION

QC14



06-09-29



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

PAINT

21.0

D35021

SUPPORT



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

SUPPORT

Batch: 27874

2T 06-09-29

22.0

D2856400

Abrasion Strip



Comment: Qty.: 1.2401 f(s)/Unit Total: 1.2401 f(s)

Abrasion Strip 7.10" long x2

Batch: 27545

2T 06-09-29

23.0

ALS41032225

Insert



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Insert

Batch: 100489

2T 06-09-29

24.0

AN960JD10

Washer



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Washer

Batch: 100743

2T 06 09 29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: ☒ Date: 06/10/03

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:42:46 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 27826A

Part Number: D350748141

Job Number:



Seq. #:

Machine Or Operation:

Description :

25.0

MS2192020

Clamp (per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Clamp (per MIL-DTL-8783C)

Batch: 15436

27 06-09-29

26.0

MS2206344

MS27038-1-10

Screw



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Screw

Batch: 18836

27 06-09-29

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install Ground wire Insert, then insert screw and washer

2-Install Abrasion strips as per Dwg D350-748-141 & QSI 035.

3-Install supports as per Dwg D350-748-141, Torque to 60-80 IN-LBS

27 06-10-02

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-241

Location: _____

PPP Rev: _____

30.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Inspection Level 21

Job Completion



POSITIVE RECALL

EFFECTIVE

RELEASED

DATE

Verification of parts
Verification of labels

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector	
06-10-03	27.4	Apply LPS procymon to the inside of walls of the x-tubes, using a saturated sponge. Qty: AIR Batch: M17168 Add step this w/o only	FL	06-10-03				
06-10-03		Add LPS procymon as per above instructions after QCS at step 28.0, and followed by a QCS. Auto Aug. Permanent change						

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

PRELIMINARY ISSUE

DESIGN 92	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO. D350-748-141	REV. B SHEET 1 OF 3
DATE 06.06.30		TITLE CROSSTUBE (AS 350/355 HI FWD) SCALE NTS	
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6017-115 & PRIME AND PAINT	

QTY	P/N	DESCRIPTION
X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	D6017-115	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP
1	MS35206-344	SCREW

D350-748-141 CROSSTUBE:

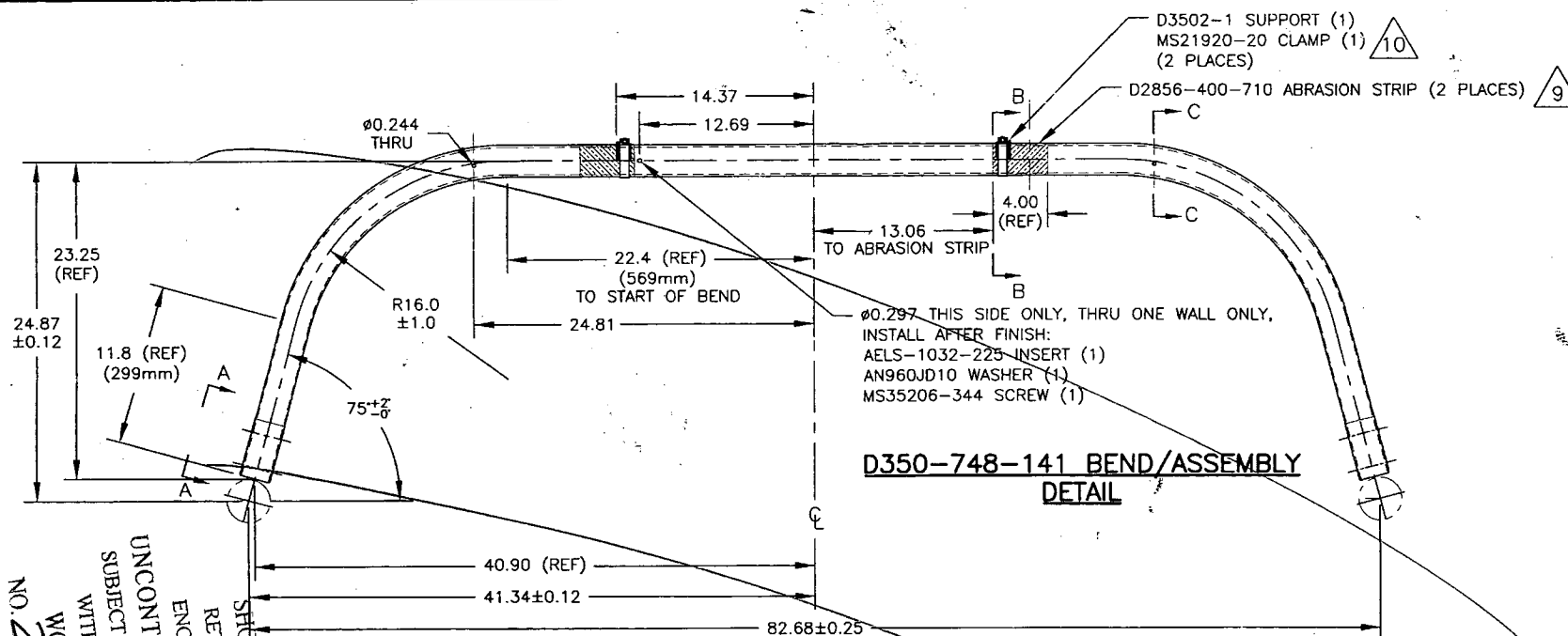
- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125
FINISHED LENGTH = 110.27±0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY. TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI/ PER MIL-T-6736 AFTER TURNING
- 6) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 7) FINISH: POWDER COAT WHITE (4.3.5.2) OUTSIDE PER DART QSI 005 4.3.
PRIME INSIDE PER DART QSI 005 4.2.
OR
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 8) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 9) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 10) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 11) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 12) ALL DIMENSIONS ARE IN INCHES
- 13) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

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WITHOUT NOTICE
WORK ORDER
NO. 27826A

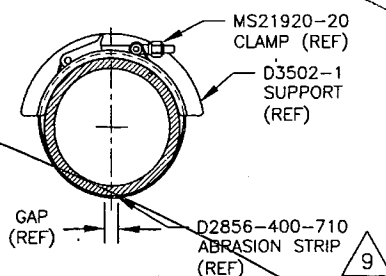
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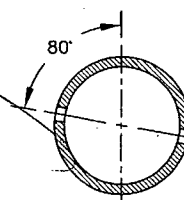
PRELIMINARY ISSUE



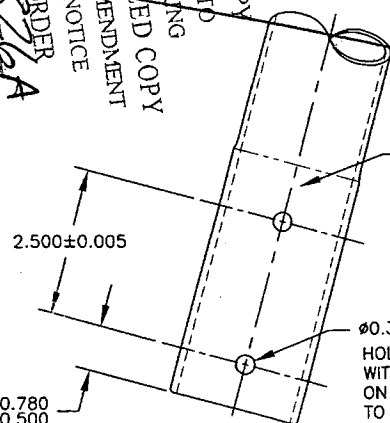
SECTION B-B
SCALE 1:2



SECTION C-C
SCALE 1:2



VIEW A-A
SCALE 1:2

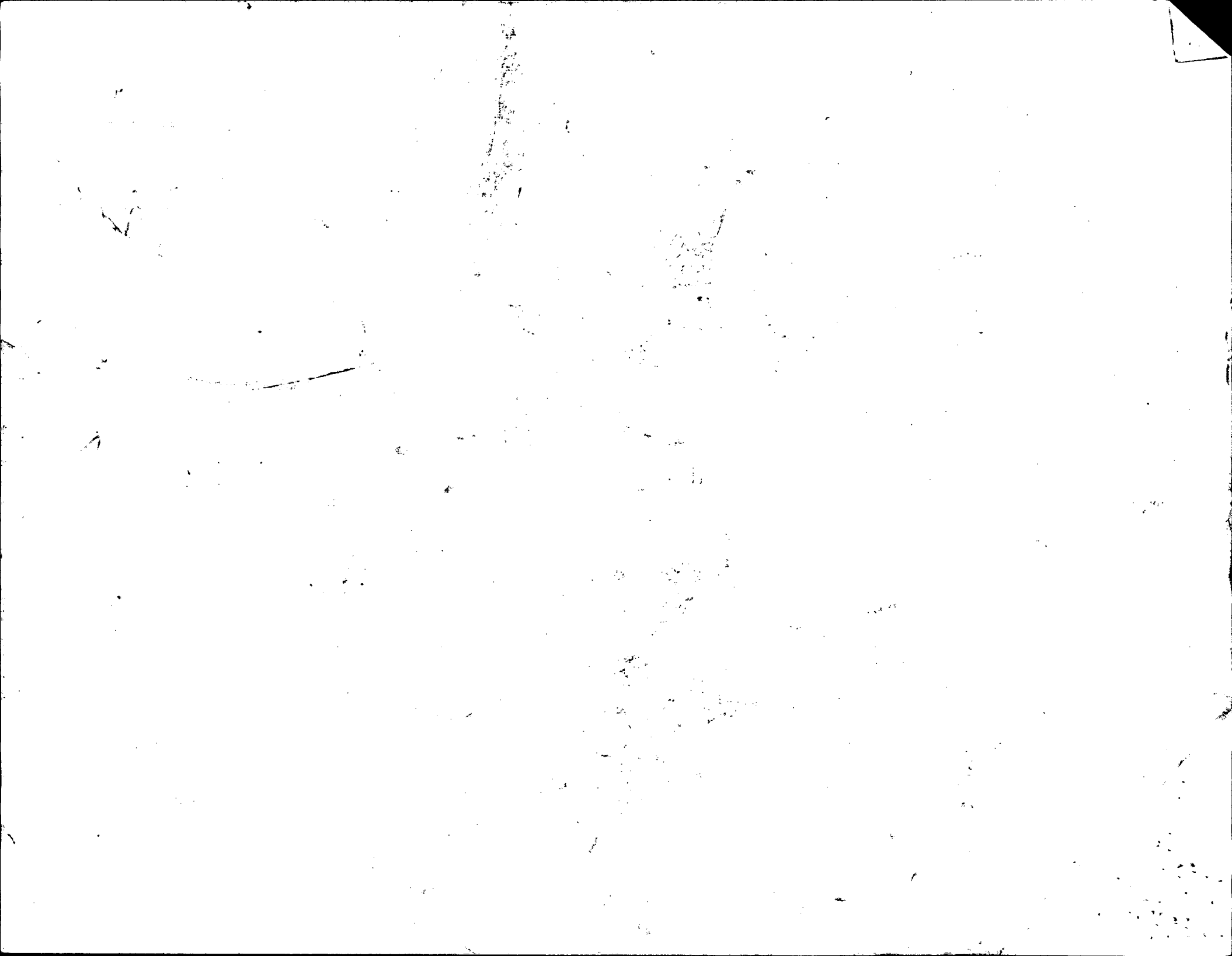


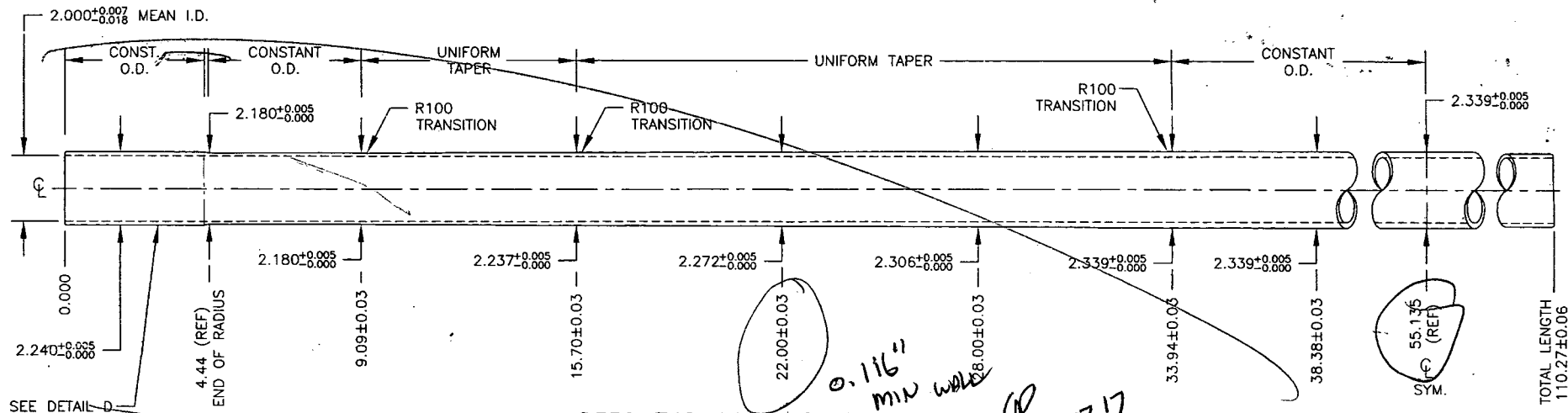
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DESIGN	q	DRAWN BY		DART	DART AEROSPACE LTD. HARRISBURG, ONTARIO, CANADA
CHECKED		APPROVED		DRAWING NO. D350-748-141	REV. B SHEET 2 OF 3
DATE	06.06.30			TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE 1:8

NO. 27826A
WORK ORDER
SUBJECT TO AMENDMENT
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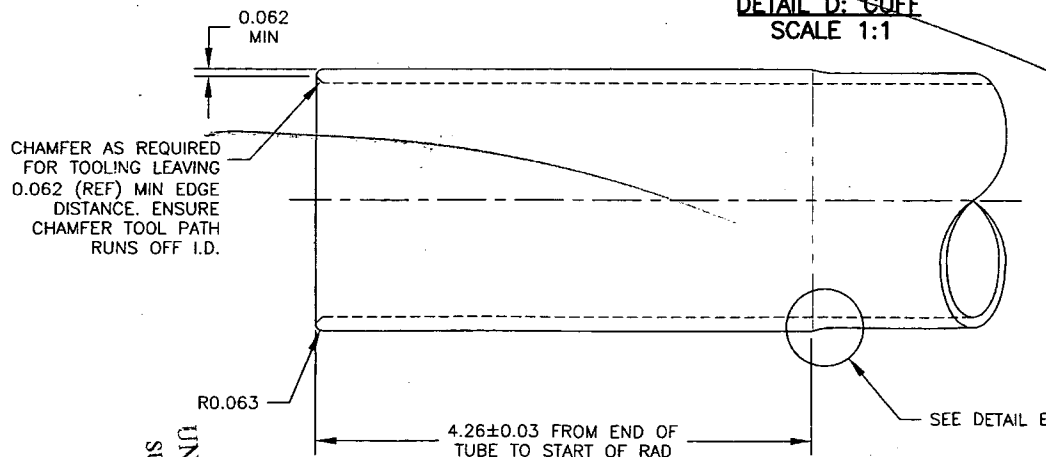


D350-748-141 MACHINING DETAIL

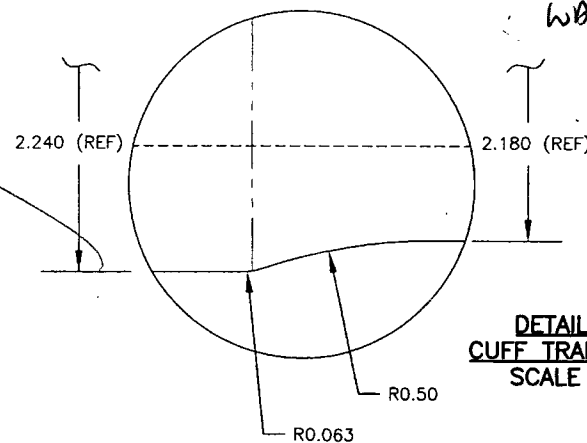
06.07.17

0.150" MIN WALL

DETAIL D: CUFF SCALE 1:1



DETAIL E: CUFF TRANSITION SCALE 9:1



PRELIMINARY ISSUE

NO. 278226 A
WORK ORDER
SHEET 3 OF 3
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CROSSTUBE (AS 350/355 HI FWD)		1:3			

DART AEROSPACE LTD		Work Order: 27926A
Description: 35 CROSS TUBE 350 FWD		Part Number: D 350-798-141
Inspection Dwg: p	Rev: B	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☒ Prototype

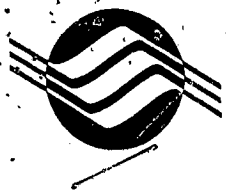
Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
0.062	$\pm .010$	0.063	—			
4.26	$\pm .030$	4.270	—			
2.240	$\pm .005$ $\pm .000$	2.242	—			
2.180	$\pm .005$ $\pm .000$	2.183	✓			
2.180	$\pm .005$ $\pm .000$	2.185	—			
2.237	$\pm .005$ $\pm .000$	2.242	—			
2.272	$\pm .005$ $\pm .000$	2.276	✓			
2.306	$\pm .005$ $\pm .000$	2.310	✓			
2.339	$\pm .005$ $\pm .000$	2.340	✓			-0.001"
2.339	$\pm .005$ $\pm .000$	2.340	✓			
110.27	$\pm .060$	110.28	✓			
0.062	$\pm .010$	0.063	—			Centre 2.339 IS -0.001"
4.26	$\pm .030$	4.280	—			
2.240	$\pm .005$ $\pm .000$	2.240	—			-0.001"
2.180	$\pm .005$ $\pm .000$	2.183	—			-0.001"
2.180	$\pm .005$ $\pm .000$	2.184	✓			
2.237	$\pm .005$ $\pm .000$	2.242	—			
2.272	$\pm .005$ $\pm .000$	2.275	—			
2.306	$\pm .005$ $\pm .000$	2.309	—			
2.339	$\pm .005$ $\pm .000$	2.340	—			-0.001"
2.339	$\pm .005$ $\pm .000$	2.341	—			

Measured by: JML
Date: 06/07/14

Audited by: BK
Date: 06.07.16

Prototype Approval:
Date:

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	



VAC AERO
INTERNATIONAL INC.

284

PACKING SLIP



HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489



QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

GST No.: R105468102

OAK 77605-1

07/28/2006

MM / DD / YYYY

PAGE : 1

1DAR01

BILL TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
07/28/2006		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
1709		COD

LN	PART NO	DESCRIPTION	UOM	QTY ORDERED	QTY SHIPPED	B/O QTY
01	D350-CROSS TUBES	Process Specifications: Procedure: 4353 HEAT TREATED TO 180-200 KSI PER AMS 2759-1C MATERIAL: 4130 D350-748-141 B27823A, B27824A, B27825A, B27826A D350-748-241 B27830A, B27829A, B27827A, B27828A NOTE: SAND BLAST TUBES	EA	8	8	0
02	LC	LOT CHARGE 320LBS X \$2.26/LB		1	1	0

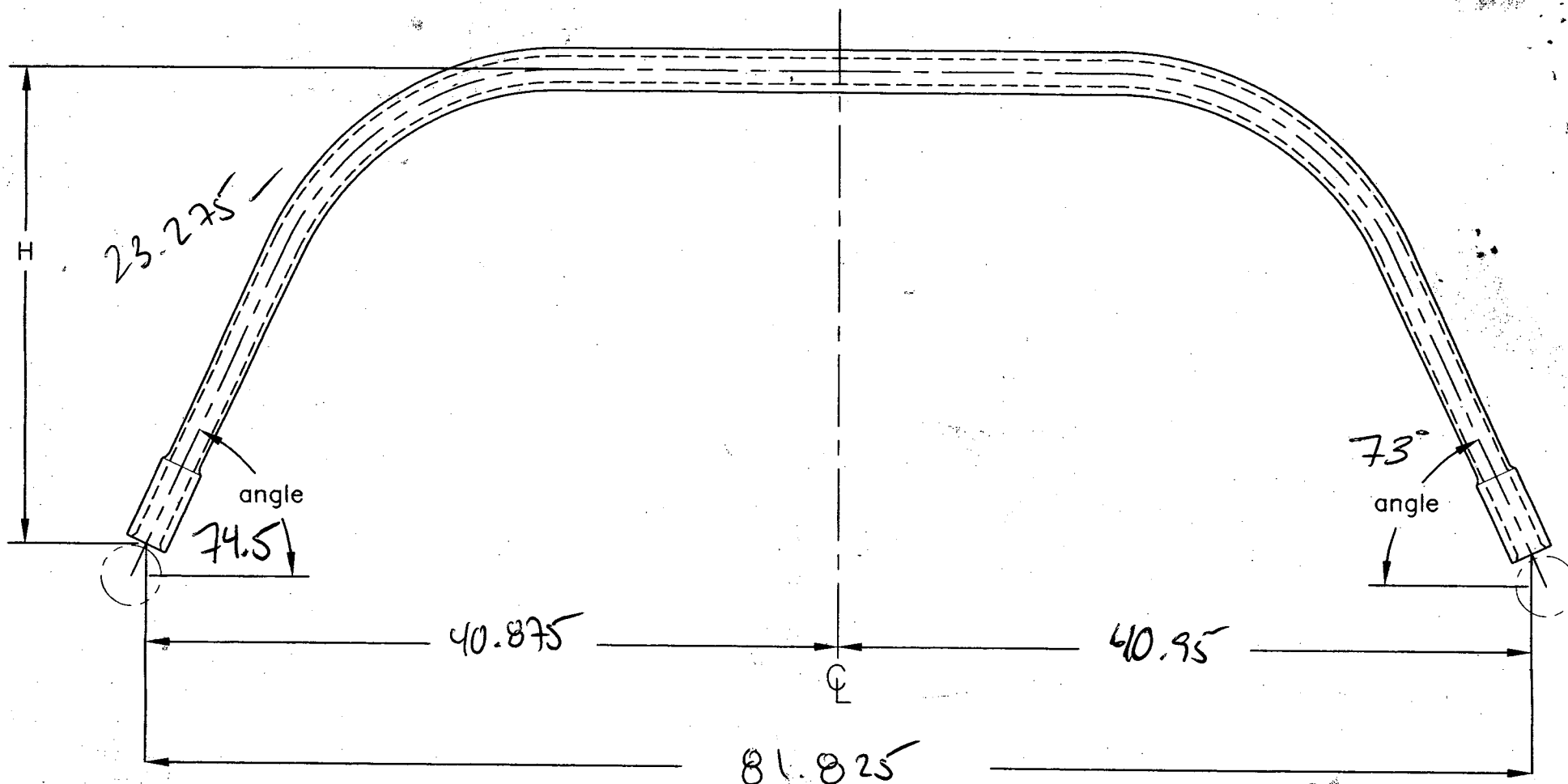
No claims for shortage in weight or count will be entertained, unless presented within 5 working days after receipt of materials by customer.



VACUUM BRAZING HEAT TREATING SPECIAL PROCESSING FURNACE EQUIPMENT



HEAT



DATE: 06-08-09

DESCRIPTION: 0350-748-141

BATCH NO: 627826A

DRAWING: 350 Prel. Rev. 6

H: 23.25

1/2 SPAN: 40.90 ± .130

TOTAL SPAN: 81.80

ANGLE: 75 ± 2

VB OVER
060907

8125

Chris Provencal

From: S Shahbazian [sshahbazian@dartaero.com]
Sent: August 17, 2006 12:18 PM
To: Provencal, Chris
Subject: FW: 350 fwd Xtube OD variation

FYI

Serge Shahbazian
Design Manager
Dart Aerospace Ltd.
Tel: 613-632-3336

-----Original Message-----

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: August 17, 2006 12:07 PM
To: 'S Shahbazian'
Cc: 'Dan Stow'
Subject: RE: 350 fwd Xtube OD variation

D350-748-141 B27825A and B27826A are acceptable to me.

David

-----Original Message-----

From: S Shahbazian [mailto:sshahbazian@dartaero.com]
Sent: Tuesday, August 08, 2006 6:48 AM
To: Shepherd, David
Cc: Provencal, Chris
Subject: FW: 350 fwd Xtube OD variation

More for your review.

Thanks
Serge

-----Original Message-----

From: Dan Stow [mailto:dstow@dartaero.com]
Sent: August 5, 2006 12:10 PM
To: sshahbazian@dartaero.com; Bill Beckett (E-mail)
Cc: chrisp@dartaero.com
Subject: 350 fwd Xtube OD variation

Bill/Serge

Please review and send to David
Thanks Dan

Attached is a photo containing the FAI sheets for the 350 fwd Xtubes Batches: 27825A and 27826A. In the last two columns renamed Actual Dims and Variance from DWG Dims are the measurements that I took after they came back from heat treating and sand blasting. Please note that the dimensions are not the same all the way around the OD of the tube, the majority of the circumferences of the tubes are within tolerance but there seems to be a "flat" spot in some places. Are the tubes acceptable?

Dan

AEROSPACE LTD		Work Order: 27926A
Description: 350 CROSS TUBE 350 FWD		Part Number: D 350-748-141
Inspection Dwg: B	Rev: B	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☒ Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
0.062	± 0.010	0.063	—			
4.26	± 0.036	4.270	—			
2.240	± 0.005 -0.000	2.242	—		Good	
2.180	± 0.005 -0.000	2.183	—		Good	
2.180	± 0.005 -0.000	2.185	—		Good	
2.237	± 0.005 -0.000	2.242	—		Good	
2.272	± 0.005 -0.000	2.276	—		Good	
2.306	± 0.005 -0.000	2.310	—		Good	
2.339	± 0.005 -0.000	2.340	—		2.335	-0.004"
2.339	± 0.005 -0.000	2.340	—		Good	
110.27	± 0.060	110.28	—			
0.062	± 0.010	0.063	—		Centre 2.335	Centre 2.339 15-0.004"
4.26	± 0.036	4.280	—			
2.240	± 0.005 -0.000	2.240	—		2.236	-0.004"
2.180	± 0.005 -0.000	2.183	—		2.176	-0.004"
2.180	± 0.005 -0.000	2.184	—		Good	
2.237	± 0.005 -0.000	2.242	—		Good	
2.272	± 0.005 -0.000	2.275	—		Good	
2.306	± 0.005 -0.000	2.309	—		Good	
2.339	± 0.005 -0.000	2.340	—		2.332	-0.007"
2.339	± 0.005 -0.000	2.341	—			

Measured by: <i>Jim</i>	Audited by: <i>SK</i>	Prototype Approval:
Date: 06/07/14	Date: 06.07.16	Date:

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	



DESIGN QP	DRAWN BY QP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED #	APPROVED #	DRAWING NO. D350-748-241	REV. C SHEET 1 OF 3
DATE 06.08.14		TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6018-125 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	

QTY	P/N	DESCRIPTION
X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
1	D6018-125	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

D350-748-141 CROSSTUBE:

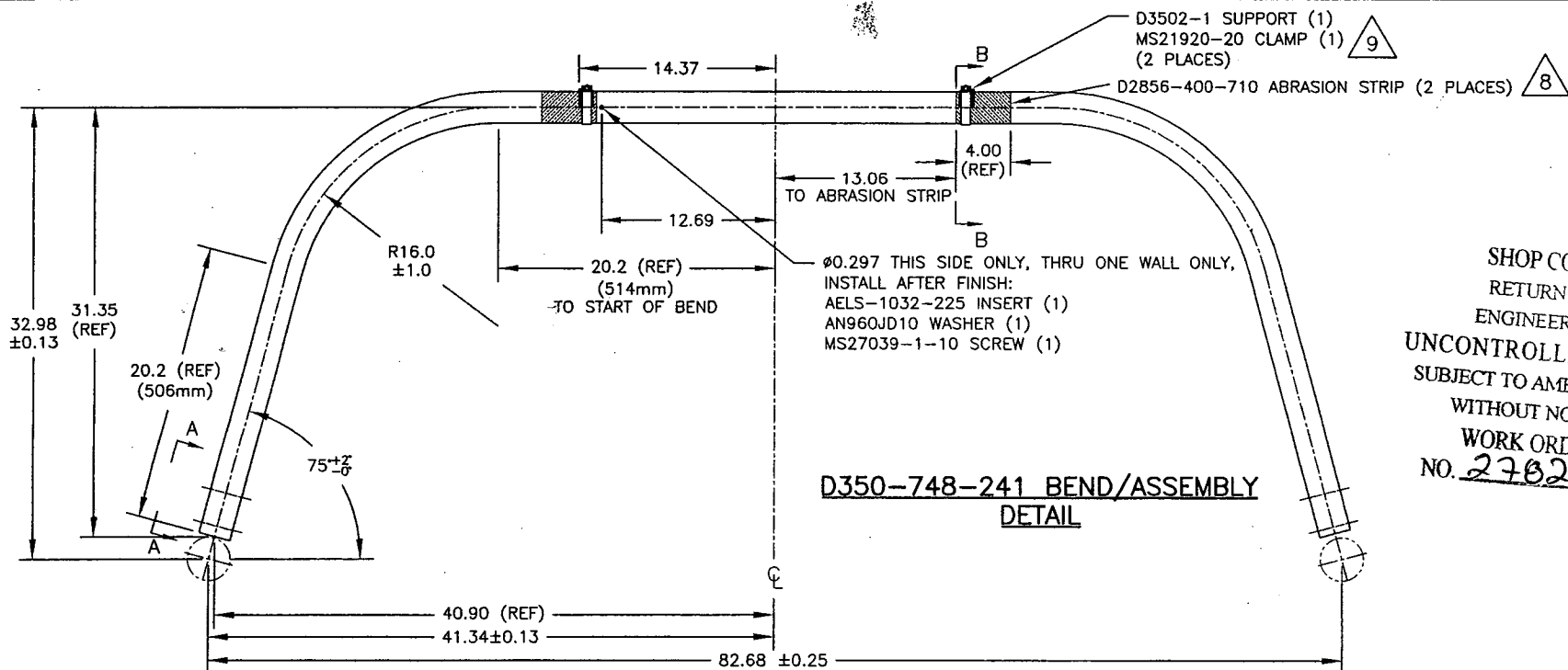
- 1) MATERIAL: MANUFACTURED FROM D6018-125 OR D6015-125
FINISHED LENGTH = 122.70±0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: CADMIUM PLATE PER QQ-P-416F, CLASS 1, TYPE II
MAGNETIC PARTICLE INSPECT PER ASTM E1444 AFTER CADMIUM PLATING
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

RELEASED

06.08.15 #

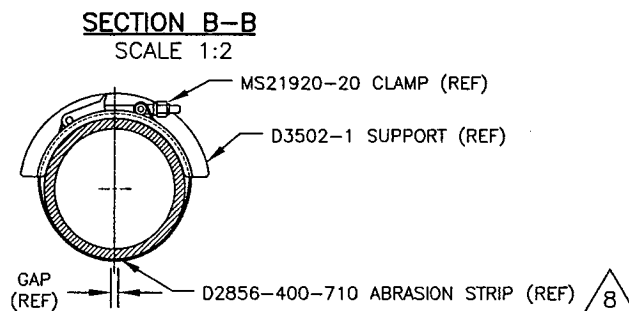
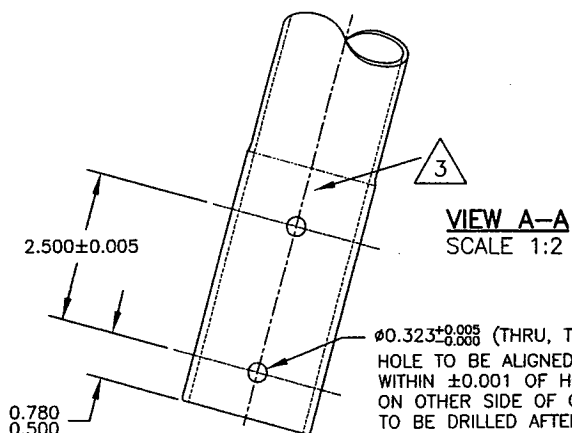
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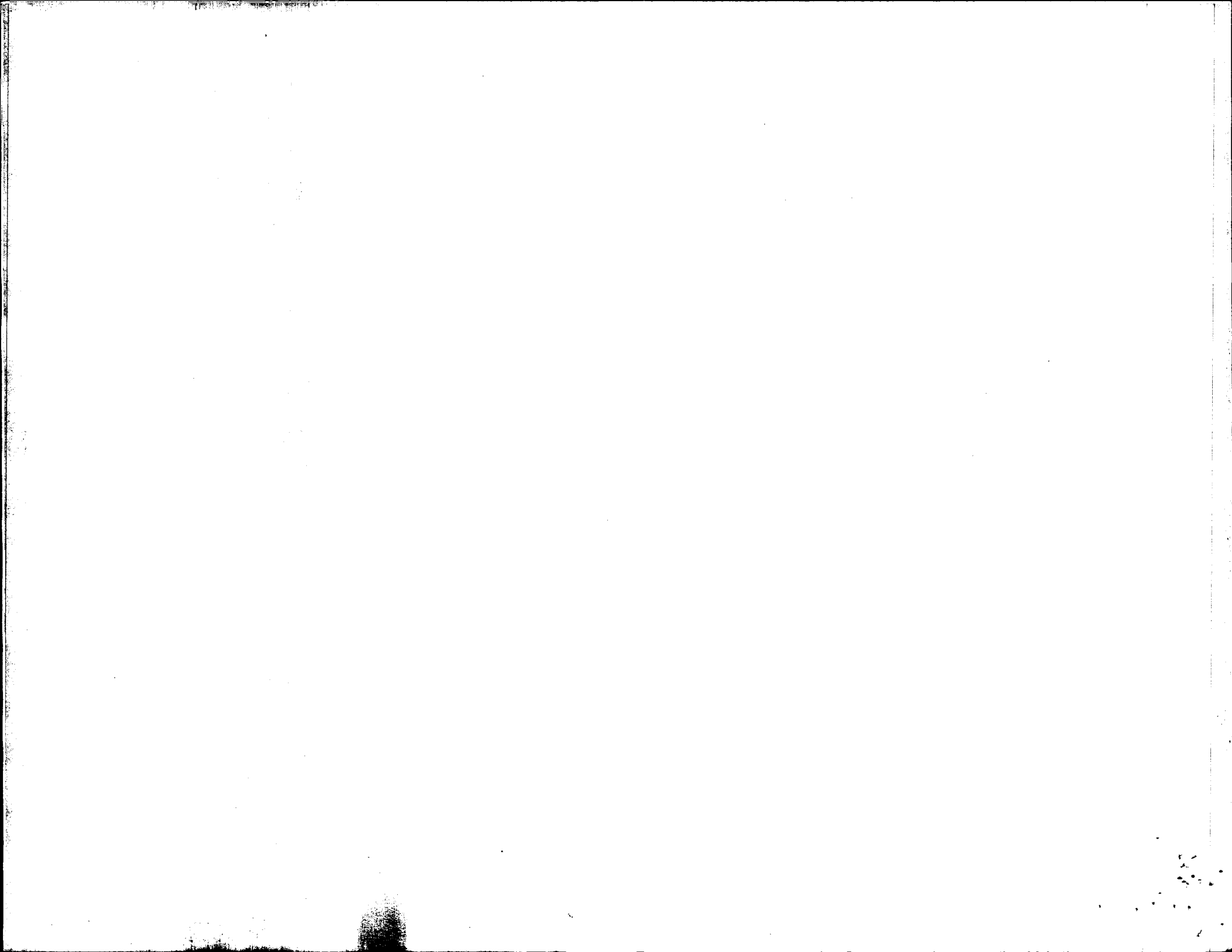
**D350-748-241 BEND/ASSEMBLY
DETAIL**

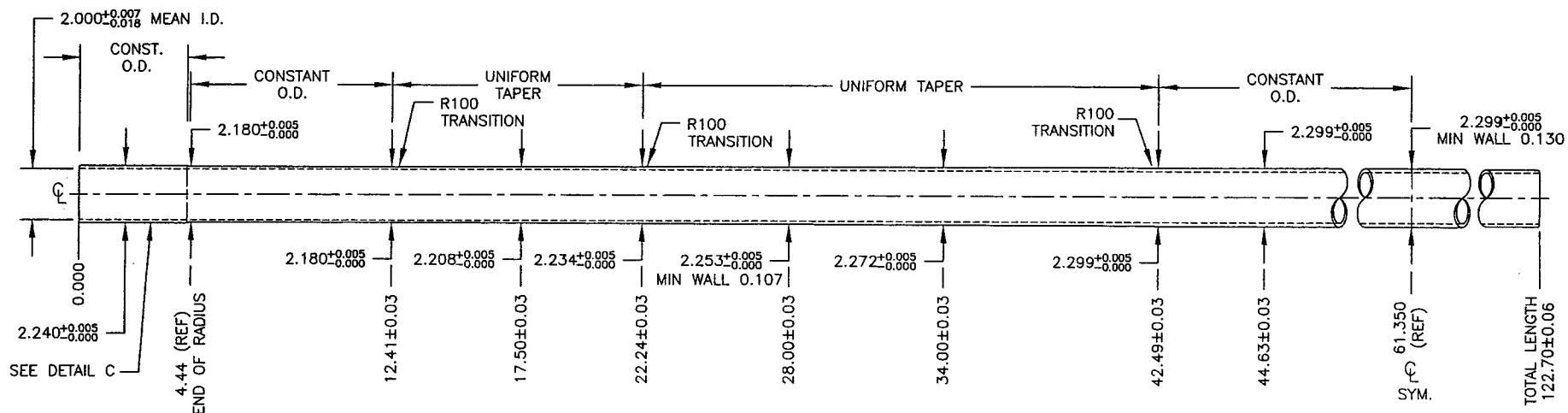
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06.08.15

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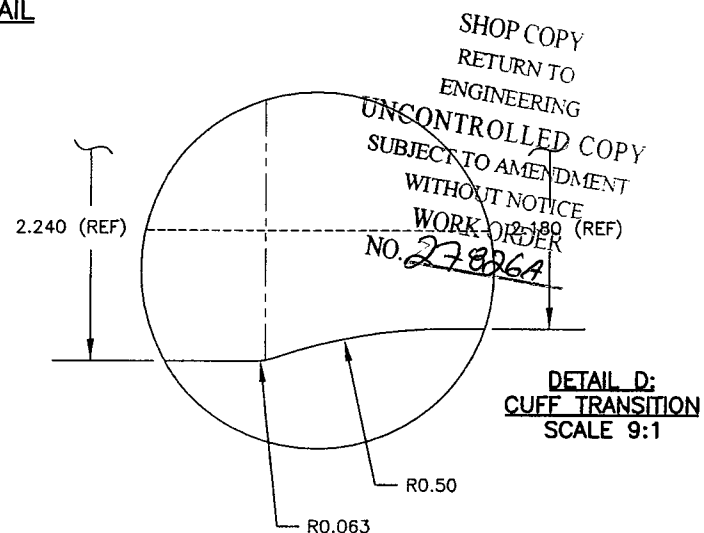
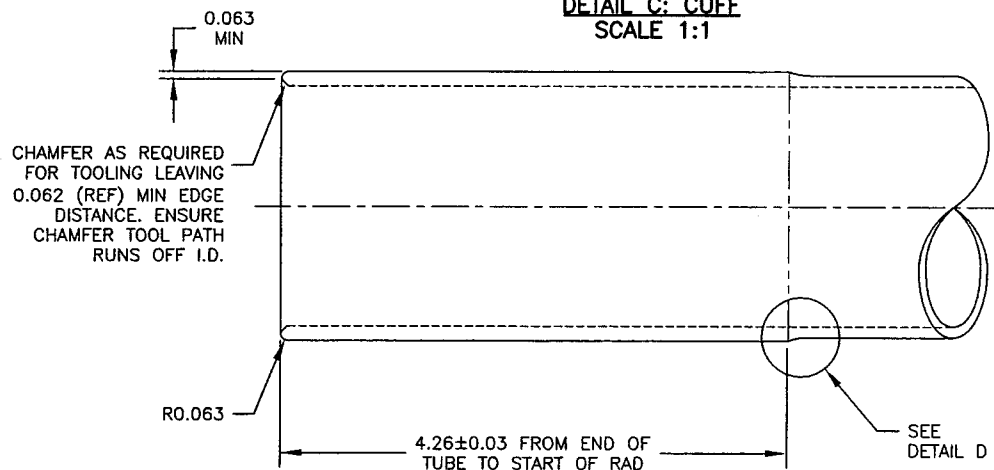


RELEASED

06.08.15

D350-748-241 MACHINING DETAIL

DETAIL C: CUFF
SCALE 1:1



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DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. HAMPSHIRE, ONTARIO, CANADA
CHECKED	APPROVED	DRAWING NO.	REV. C
DATE		D350-748-241	SHEET 3 OF 3
06.08.14		TITLE	SCALE
		CROSSTUBE (AS 350/355 HI AFT)	1:4

PACKING LIST

PACKING LIST NO: 310991
DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

TERMS: C.O.D.

QUANTITY BALANCE PART NUMBER/DESCRIPTION
SHIPPED QTY

1	0	D350-748-141	S/N: B27825A JOB: 542793
1	0	D350-748-141	S/N: B27823A JOB: 542813
1	0	D350-748-141	S/N: B27826A JOB: 542814
1	0	D350-748-241	S/N: B27830A JOB: 542815
1	0	D350-748-241	S/N: B72827A JOB: 542816
1	0	D350-748-241	S/N: B27828A JOB: 542817

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

PACKING LIST

PACKING LIST NO: 310991
DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

TERMS: C.O.D.

QUANTITY BALANCE PART NUMBER/DESCRIPTION
SHIPPED QTY

5. Inspect

Docn No.:
Ship Via: OTHERS

K



SOUTHWEST

United Industries, Inc.

422 S. ST. LOUIS / TULSA, OK 74120
PHONE 918-587-4161 / FAX 918-582-6158
ACCOUNTING FAX 918-585-2952

CERTIFICATION

CERT NO: 310991
DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

R/S

QUANTITY PART NUMBER/DESCRIPTION

1	D350-748-141	S/N: B27825A JOB: 542793
1	D350-748-141	S/N: B27823A JOB: 542813
1	D350-748-141	S/N: B27826A JOB: 542814
1	D350-748-241	S/N: B27830A JOB: 542815
1	D350-748-241	S/N: B72827A JOB: 542816
1	D350-748-241	S/N: B27828A JOB: 542817

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

5. Inspect

WE CERTIFY THAT THE PARTS LISTED ABOVE HAVE BEEN PROCESSED IN ACCORDANCE WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE ABOVE REFERENCED PURCHASE ORDER. DOCUMENTATION IS ON FILE AND AVAILABLE FOR REVIEW

Certification

FAA Repair Station CN2R748K

Randy Bruner
Inspector

NOTE: SUBJECT TO SOUTHWEST COMPANIES, INC. STANDARD TERMS & CONDITIONS

INVOICE

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

INVOICE NO: 310991
DATE: 09/22/06
SHIP DATE: 09/22/06
P.O. NUMBER: 274711
TERMS: C.O.D.

QUANTITY	PART NUMBER/DESCRIPTION		UNIT PRICE	AMOUNT
1	D350-748-141	S/N: B27825A JOB: 542793	1980.00	1980.00
1	D350-748-141	S/N: B27823A JOB: 542813		
1	D350-748-141	S/N: B27826A JOB: 542814		
1	D350-748-241	S/N: B27830A JOB: 542815		
1	D350-748-241	S/N: B72827A JOB: 542816		
1	D350-748-241	S/N: B27828A JOB: 542817		

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

INVOICE

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

INVOICE NO: 310991
DATE: 09/22/06
SHIP DATE: 09/22/06
P.O. NUMBER: 274711
TERMS: C.O.D.

QUANTITY PART NUMBER/DESCRIPTION

UNIT PRICE AMOUNT

5. Inspect

Docn No.:
Ship Via: OTHERS

K

Total Amount 1980.00

Chris Provencal

From: David Shepherd [dshepherd@dartaero.com]
Sent: October 3, 2006 10:03 AM
To: 'Chris Provencal'
Cc: 'S Shahbazian'; 'Beckett, Bill'
Subject: RE: 350 xtube cad plating

Chris,

I think the modified CAD plating procedure is acceptable.

As we discussed, I had some concern about the stress relieving comment on the packing slip because I didn't realize that by heating up the tubes, we would be stress relieving them. We didn't test our crosstubes in a stress relieved condition. The crosstubes we tested had compressive stresses in the tensile stress areas of the crosstube. However, because the highest stress areas are in the unbent portion of the crosstube and because I think we had so much margin in our drop test (no shock absorbers, damaged parts, overloaded, etc ...), my gut tells me that we are OK and I don't think we need to re-test.

I'm glad to hear that we are dimensionally checking the crosstubes after all the heating. I think this step should be added to the work order on receiving inspection for every crosstube.

As we discussed, I think a drawing revision is in order. I think reference to a QSI for the procedure outlined on the packing slip would be best.

David

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Monday, October 02, 2006 2:17 PM
To: David Shepherd (David Shepherd)
Cc: 'S Shahbazian'; 'Bill Beckett (Bill Beckett)'
Subject: 350 xtube cad plating

David,

There is another set of 350 xtubes they want to send out tomorrow. I don't know if you've had a chance to review the cad plating issue. They're eager to get a response.

To recap:

-I originally told you that the magnetic particle was done first. That was the plan, but they ended up following the drawing (cad->magnetic). The invoice I sent you gives the correct order the work was done.

-The cad plating was done to AMS-QQ-P-416B (issued 2004 by SAE) instead of the drawing's' QQ-P-416F (issued 1991 by military). I don't see a problem with this since it's a more current issue, and the only reason we specified QQ-P-416F is because that's what the "old" never-used supplier suggested.

-The dims were re-checked after cad plating and the dimensions did not change.

-An NCR has been created to address the problem with the work orders. The bigger issue is that one was sent to a customer and we need to take action on that one asap.

If you need more info, let me know.

03/10/2006

Chris Provencal

From: David Shepherd [dshepherd@dartaero.com]
Sent: October 3, 2006 10:03 AM
To: 'Chris Provencal'
Subject: RE: NCR D350-748-141 (another)

Acceptable deviation. There is no concern about the grounding wire. From what I saw, there is more than enough slack in the system.

David

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Monday, October 02, 2006 2:29 PM
To: David Shepherd (David Shepherd)
Subject: NCR D350-748-141 (another)

This is a different issue from the cad plating.

For one D350-748-141 crosstube, the hole for the grounding wire is 0.090" further inboard (towards the center of the crosstube). This crosstube was drilled by hand before they created their drill jig. The error was caught when they rechecked the crosstube to the tooling.

The only problem I see with this is the remote chance the grounding wire isn't long enough, which is more of a risk on Dart (potential return) and not a safety issue.

-Chris

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03/10/2006

